REMARKS

The application included claims 1-4, 6-13, and 18-30 prior to entering this response.

No claims are amended herein.

The application remains with claims 1-4, 6-13, and 18-30 after entering this response.

Applicant's Response – General Comments

Applicant provided a detailed argument why the combination of Hajjahmad with Maurer fails to disclose the features being relied upon by the Examiner in the response filed on February 17, 2010 and as previously made at least with respect to the Maurer reference in the response filed on August 24, 2009. In the November 23, 2009 Office Action, the Examiner stated that Applicant's arguments were moot in view of the new grounds of rejection, even though the Examiner continued to rely on Maurer as disclosing the features which Applicant traversed and argued against. At page 2 of the Final Office Action dated May 18, 2010, the Examiner provided only a partial response to Applicant's arguments with respect to the features that are allegedly disclosed by Hajjahmad. Furthermore, the Examiner failed to fully respond to Applicant's detailed arguments concerning the combination of references, and in particular with respect to the features allegedly disclosed by Maurer, and appears to more or less repeat the grounds for rejection of claim 1 as previously made at page 3 of the November 23, 2009 Office Action. Applicant regrets that the Examiner has chosen not to fully respond to Applicant's rebuttal arguments during prosecution, as it is believed this could have significantly expedited prosecution of the subject application.

The rejection under 35 U.S.C. § 112 is arbitrary and capricious

The Examiner rejected claim 30 under 35 U.S.C. § 112. The rejection is traversed. Claim 30 recites, in part, w*herein the number of bits of the color element decreased from the full image level corresponds to a level of the image noise.*

Support for claim 30 may be found variously throughout the specification, for example at paragraphs 0028-0030 of the published application. Paragraph 0028 discloses that "each **color element** has a 256 scale for a pixel, i.e., each color element is composed by a byte." Paragraph 0029 further discloses that the "color level scale of every color element in all pixels of the scanned image are reduced" and that the "purpose of the step 104 is to set a noise level and to

subtract the image from **the noise level.**" Paragraph 0030 continues by stating that "the number n and m are dependent on **the reduced number of bits** in step 104, i.e., dependent on the noise level."

In rejecting claim 30, the Examiner explicitly highlighted the words "**the number of bits of the color element**". Applicant respectfully submits that this claim language is supported by the above citations, particularly when read in view of the example embodiments which describe that "if a red color level scale of a pixel is 43 (i.e., 001101011 in binary), the color level scale is then reduced to 40 (i.e., 00101000)" and "if the reduced number of bits are 2" from paragraphs 0029 and 0030, respectively.

Previously presented claim 1 recites, in part, *wherein the number of bits reduced from the full color level corresponds to an image noise level associated with scanning the image*, and previously presented claim 18 recites, in part, *decreasing a number of bits of the color element from the one or more pixels, wherein the number of bits corresponds approximately to the image noise*. Applicant respectfully submits that the present rejection of claim 30 as reciting *the number of bits of the color element* appears to be arbitrary and without basis. Accordingly, withdrawal of the rejection of claim 30 is respectfully requested.

Claim Rejections - 35 U.S.C. § 103

The Examiner rejected claims 1-4, 6-13, and 18-30 under 35 U.S.C. § 103(a) over Hajjahmad *et al.* (U.S. Patent 5,748,770) in view of Maurer *et al.* (U.S. Patent 6,650,773).

The rejection is traversed. Previously presented claim 1 recites a computer-implemented method, comprising:

> scanning an image with a scanner to obtain a full color level of a color element of a pixel of the scanned image;
>
> decreasing the full color level of the color element by reducing a number of bits of the full color level of the color element to form a reduced color level image, wherein the number of bits reduced from the full color level corresponds to an image noise level associated with scanning the image;
>
> composing a pattern comprising the number of bits reduced from the full color level of the color element, wherein the pattern has less color level of the color element than the full color level; and
>
> restoring the full color level of the color element of the pixel by combining the reduced color level image with the pattern.

A. The Examiner's grounds for rejection require Impermissible Hindsight

Hajjahmad is directed to processing an electronic image by transforming color parameters between the spatial domain and the frequency domain (col. 1, lines 42-54; col. 2, lines 18-34). A color resolution of the image transformation is obtained by reconstructing an array of image pixels into a shifted array of pseudo pixels (col. 2, lines 49-59).

In contrast, Maurer is directed to performing compression of an image (Abstract). The only mention of image compression in Hajjahmad is the comment that compression of an image can be performed according to any of a known image processing function, such as resizing (col. 4, lines 6-11). Other than this brief reference to compression, Hajjahmad is not concerned with compression, does not disclose any problems of compression, nor does he describe trying to restore any image which has been compressed. Similarly, Hajjahmad itself is not at all concerned with any novel method of removing image noise, making only a brief reference to noise removal at column 4, line 10. Rather, Hajjahmad describes transforming color parameters between the spatial domain and the frequency domain, as previously discussed (see col. 4 lines 44-46).

A transformation of color parameters between domains is a completely different methodology than the compression of images as described by Maurer. Applicant respectfully submits that the Examiner has interpreted these separate processes as somehow being combinable to disclose Applicant's claims, even though neither Hajjahmad nor Maurer disclose or suggest using the transformation of color parameters between spatial and frequency domains, as taught by Hajjahmad, to correct for color loss due to compression of an image, as taught by Maurer. Applicant respectfully submits that combining these references in the proposed manner is only possible through impermissible hindsight.

B. No prima facie case of Obviousness

The Examiner failed to meet the legal burden of establishing a prima facie case of obviousness under MPEP 2142 at least for the reason that (1) the Examiner has not provided a proper suggestion or motivation to combine the references, (2) there is no reasonable expectation of success, and (3) the combination of references does not teach or suggest all the claim elements.

1. No motivation to combine

By way of providing motivation to combine Maurer with Hajjahmad, the Examiner stated that it would have been obvious to modify Hajjahmad to include "decreasing the color level of the color element by reducing a number of bits of a full color level of the color element to form a reduced color level image, wherein the number of bits reduced from the full color level corresponds to an image noise level associated with scanning the image... to reduce image noise" (see middle of page 6 of the Final Office Action). The stated motivation for combining the references appears to be a near verbatim recitation of Applicant's own claim 1. Applicant respectfully submits that it is improper to find a motivation to combine references from Applicant's own specification, let alone from Applicant's claims.

2. No reasonable expectation of success

Even assuming, for argument's sake, that the combination of Maurer with Hajjahmad is appropriate, Applicant respectfully submits that a bit-depth truncation of the color level, as taught by Maurer, would be contrary to the stated purpose of Hajjahmad's transformation process. Hajjahmad is attempting to reconstruct a color array of the scanned image by interpolating colors between pixels. Bit-depth truncation of the color level during this transformation, as proposed by the Examiner in view of Maurer, would effectively decrease the color level, contrary to the stated purpose of Hajjahmad to realize a full color resolution of the image (col. 2, lines 49-51). Since Hajjahmad teaches that the full color level is achieved by interpolating the color levels between pixels, the combination would presumably teach interpolating the reduced color levels that resulted from Maurer's bit-depth truncation. The resulting transformation would result in an image with an overall reduced color level than that of the original scanned image.

Neither Maurer nor Hajjahmad disclose how a lost color level could be restored to the array of pseudo-pixels in the transformed image of Hajjahmad. Whereas Maurer describes reconstructing the luminance channel according to the same lossless standard (col. 3, lines 43-46), the transformation of Hajjahmad has replaced the previous color information with a pseudo-pixel array such that the same lossless standard of Maurer would no longer apply.

The color levels associated with the initial scanned image in Hajjahmad are operated on

to provide the color resolution of the final image (col. 2, lines 49-59 and col. 10, lines 35-39). According to Hajjahmad, the full color resolution of the image is only obtained after the interpolation and combination of the multiple color channels has been completed (col. 10, lines 16-21). This "full color resolution" of Hajjahmad is not known beforehand, rather the results are obtained only after operating on the electronic image data of the scanned image to account for the inherent limitations of the red, green and blue color channels (col. 9, lines 23-45). In other words, the reconstructed colors of Hajjahmad do not match the actual color values of the original scanned image, but are interpolated from the color values of neighboring pixels.

3. The claim elements are not taught by the proposed combination

In rejecting claim 1, the Examiner alleged that Hajjahmad discloses composing a pattern comprising the color element having less color level than a full color level, and identified FIG. 4, steps 404-414 and column 10, lines 22-39 in support (page 5 of the Final Office Action). Specifically, the Examiner argued that either of the horizontal or vertical color channels shown in FIG. 4 must necessarily include less color than the combined horizontal and vertical color channels.

Applicant initially remarks that claim 1 does not merely recite a pattern comprising the color element having less color level, but rather claim 1 recites, in part, *composing a pattern comprising the number of bits reduced from the full color level of the color element, wherein the pattern has less color level of the color element than the full color level.* Therefore, Applicant respectfully submits that the Examiner's grounds for rejection fail to properly take into account the recited claim language and features disclosed therein.

Applicant furthermore respectfully submits that the mere fact that Hajjahmad describes processing the horizontal and vertical channels separately from each other has nothing to do with *composing a pattern comprising the number of bits reduced from the full color level of the color element* as recited by claim 1. According to Hajjahmad, the color recovery being sought by processing the horizontal and vertical channels is the result of the separate pixel elements of a charge coupled device (CCD) that are only responsive to one third of the color spectrum (col. 9, lines 23-42). The CCD is described as including a red, green and blue pixel, such that a red pixel is unresponsive to the green and blue color spectrums, the green pixel is unresponsive to the red and blue color spectrums, and the blue pixel is unresponsive to the red and green color

spectrums. By processing or interpolating the color values in vertical and horizontal directions, pixels which would otherwise only be represented by a single color (e.g. red) may be interpolated with neighboring pixels to include representations of the other two colors (e.g. green and blue).

For a red pixel of the CCD, no red pixel data is removed or added in the processing described by FIG. 4, rather pixel data from the surrounding green and blue pixels are added so that a single pixel includes color data for red, green and blue. Accordingly, the processing of the color channels, as described by Figure 4 of Hajjahmad and as relied upon by the Examiner, does not describe *a pattern comprising the number of bits reduced from the full color level of the color element*, but rather the processing provides for filling in completely missing color data of two of the three colors at any one pixel location.

Hajjahmad describes that the original electronic image data is itself operated on by a transformation process to obtain a new image comprising interpolated pixel values, which are estimated based on the mathematical operations of PCT and IPCT coefficients (col. 10, lines 64-67). In other words, the "full color resolution" obtained by Hajjahmad's transformation operation does not restore the initial electronic image data of the scanned image, but are a modification of the electronic image data based on the interpolation of neighboring pixels as previously described.

According to Hajjahmad, the red, green, and blue pixels of the CCD scanner are limited to scanning certain frequencies of light, and hence an interpolation is made to each color channel to provide missing color components and then the color channel results are combined so that each pixel contains combined color data from each channel (col. 9, lines 23-45). The vertical and horizontal channels are separately processed and combined since a pixel will have neighbors in both the horizontal and vertical direction that are interpolated for the missing color data. For a given red pixel, for example, combining the vertical and horizontal channels does not result in an increased color level of red, rather the combined results provides a more accurate interpolation of the missing green and blue colors that are then added to the red pixel in question. These estimated colors are not even applied to the original pixel locations, but are assigned to the neighboring pseudo-pixel locations (col. 15, lines 55-61), such that Hajjahmad's transformed color results are provided for a different pixel location than where the color was actually scanned from. Accordingly, the processing of the color channels of Hajjahmad also fails to disclose

restoring the full color level of the color element of the pixel by combining the reduced color level image with the pattern.

Applicant has similarly provided detailed argument why Maurer also fails to disclose *restoring the full color level of the color element of the pixel by combining the reduced color level image with the pattern,* and these arguments can be found in the Response dated August 14, 2009 at pages 7 to 9. Furthermore, the Examiner appears to have withdrawn the argument that Maurer discloses these features based on the reliance on Hajjahmad as found in the Final Office Action.

In rejecting claim 1, the Examiner acknowledged that Hajjahmad fails to disclose reducing a number of bits of the full color level of the color element, and instead suggested that Maurer discloses these features. Specifically, the Examiner identified Maurer's reference to discarding visual contouring artifacts as disclosing a method for reducing image noise (page 3 of the Office Action). Applicant respectfully submits that visual contouring artifacts do not suggest image noise, as recited by claim 1. Rather, the image noise is described as being reduced in the pre-processing step of Maurer. At column 2, lines 15-19, Maurer describes pre-processing the digital image to remove random noise, Guassian noise, and "salt and pepper" noise. Applicant respectfully points out that the optional pre-processing step occurs prior to any of the compression steps that form the majority of Maurer's specification (Fig. 1 and col. 2 lines 14-22). Furthermore, the compression steps may be completed independently of the pre-processing step (col. 2 lines 19-30), since they are directed to the different purposes of image compression versus removing noise.

Accordingly, Applicant respectfully submits that any suggestion that the compression method of Maurer is directed to a method for reducing image noise is improper. Furthermore, the Examiner's assertion that he interprets noise to include contouring artifacts (page 4, final paragraph) is not controlling when Maurer himself has separately defined and treated these terms differently in the specification. Neither Hajjahmad nor Maurer are directed to reducing image noise, and accordingly, the combination fails to disclose *wherein the number of bits reduced from the full color level corresponds to an image noise level associated with scanning the image*, as recited by claim 1.

Claims 6, 8, and 18 are believed to be allowable for at least some of the reasons provided above with respect to claim 1. As claims 2-4, 7, 9-13, and 19-30 depend from claim 1, 6, 8, or

18, they are believed to be patentable over the art for at least the foregoing reasons, as well as for the further novel features recited respectively therein. Accordingly, withdrawal of the rejection of claims 1-4, 6-13, and 18-30 is respectfully requested.

Any statements made by the Examiner that are not addressed by the Applicant do not necessarily constitute agreement by the Applicant. In some cases, the Applicant may have amended or argued the independent claims thereby obviating grounds for rejection of the dependent claims.

CONCLUSION

For the foregoing reasons, the Applicant respectfully requests reconsideration and allowance of the present application. The Examiner is encouraged to telephone the undersigned at (503) 546-1812 if it appears that an interview would be helpful in advancing the case.

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Respectfully submitted,

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